

# The Effects of the Acupuncture Treatment for Smoking Cessation in High School Student Smokers

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The use of alternative medicine for smoking cessation have been increasing steadily in recent years. A series of clinical group studies was performed to clarify the effect, outcome and success rate of an acupuncture treatment for smoking cessation. This study was conducted for four weeks using 238 smoking students at 2 high schools. The subjects were separated into two groups: 159 students were treated with acupuncture on the anti-smoking acupoints of the ear, which is known to be effective for cessation of smoking (case group), and 79 students were treated at other sites of the ear (control group). The acupuncture treatment was alternately administered at each side of the ears on a weekly basis for 4 weeks. The smoking cessation success was only 1 case (0.6%) in the case group and none in the control group after 4 weeks. The change in the taste of tobacco and the intensity of the desire to smoke were not significantly different between the case and control groups, but the case group showed a tendency of reduction in the taste of tobacco and the intensity of the desire to smoke. In addition, the reduction in cigarette consumption was not significant, but the tendency of reduction in the study group was significant. It is believed that the site of auricular acupuncture for smoking cessation is not important. However, there was a significant tendency in terms of the reduction in cigarette consumption, the taste of tobacco and the intensity of the desire to smoke in the case group, indicating that auricular acupuncture in smoking cessation has some effect.

**Key Words:** Smoking cessation, acupuncture, complementary therapy

## INTRODUCTION

Smoking is the most significant risk factor for

many diseases such as lung, laryngeal, and esophageal cancers, as well as coronary artery diseases, cerebrovascular diseases, chronic lung diseases, and gastric ulcers.<sup>1,2</sup> Therefore, smoking cessation is an important health issue for the World Health Organization (WHO), and has been emphasized all over the world.<sup>3</sup>

Since the 1990s, it has been considered very important to decrease the smoking rate by using active smoking cessation activities and providing information regarding the toxicity of smoking.<sup>4</sup> According to the Korean Gallop polls, the incidence of smoking was 60.5% in 2002, 65.1% in 1999, 70.1% in 1996, 73.0% in 1994, and 75.6% in 1990 for men, 6.0% in 2002, 4.8% in 1999, 5.6% in 1996, 3.4% in 1994, and 6.7% in 1990 for women.

According to the OECD health data for 1998, the smoking rate of Korean men (64.1%) is quite high compared to that of American (22.6%), British (26.0%) and Japanese (55.2%) men. In contrast, the smoking rate of Korean women (5.9%) is low compared to that of Americans (18.1%), British (28.0%) and Japanese (13.3%) women.

According to the smoking related death study, 16.6% of Korean adult deaths are believed to originate from smoking, including 31.6% of total malignant neoplasms, 71.8% of oral pharyngolaryngeal cancers, 43.4% of esophageal cancers, 25.1% of stomach cancers, 11.7% of colon cancers, 13.5% of rectosigmoid cancers, 31.6% of hepatocellular carcinomas, 25.8% of pancreatic cancers, 69.0% of lung cancers, 93.2% of laryngeal cancers, 31.3% of bladder cancers, 15.6% of cerebrovascular diseases, 33.5% of ischemic heart diseases, 32.9% of hypertensive heart diseases, 43.2% of gastroduodenal ulcers, and 46.5% of bronchiectases.<sup>5</sup>

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One of the main concerns regarding the future health problems of Korea is the high smoking rate among young people. The smoking rate of Korean youth (middle, high school students) has increased consistently according to a Yonsei University Graduate School of Public Health study and reached 35.3% in male high school students (in 1997) and 7.4% in male junior high school students (in 2000).<sup>6</sup> Moreover, it was supposed that the actual smoking rate is 10% higher than that of an inquiry method. In one study, the smoking rate of a high school students in Seoul was approximately 19% by questionnaire, but was reported to be 31.9% according to detection of a urine cotinine, which indicates recent smoking.<sup>7</sup> According to the study on smoking of elementary school students in Seoul and Incheon in 1996, the current smoking rate was 1.04% in males and 0.15% in females, and the smoking experience rate was 13.4% in male and 2.9% in female 5th grade school children.<sup>8</sup>

Until now many smoking cessation techniques have been used. These include smoking cessation by advice, behavioral therapy, hypnotherapy, bupropion, nicotine replacement therapy, nicotine antagonist, and alternative medicine therapy such as smoking cessation acupuncture, herb and aroma. It was reported that the success of smoking cessation of each therapy varied, but no single effective method has been identified. The exact time that smoking cessation acupuncture was adapted into Korea is not known. The use of smoking cessation acupuncture has been increasing during the last 10 years, and is given with behavioral therapy and smoking cessation by advice in health centers and social welfare facilities. There have been some studies on the effect on smoking cessation acupuncture in foreign countries, but there are only few reports in Korea. The report by Kang et al. showed a smoking cessation rate of 25% and a decreased taste of cigarette and desire to smoke after acupuncture treatment.<sup>9</sup> There are studies reported in Oriental medicine articles,<sup>10</sup> but there has been no well-designed, case control studies. This study aimed to determine the effect of smoking cessation using acupuncture.

## MATERIALS AND METHODS

### Study subjects

The survey was conducted using 238 male students in the 1st, 2nd, and 3rd grades at 2 high schools in the local metropolitan area. Each student had smoked continuously before the beginning of this study, and had no health problems. Ear acupuncture was given on the smoking cessation acupuncture points (case) in 159 people from one high school, and was given on the other points (control) in 79 people of the other high school.

### Questionnaire

The subjects were first interviewed after a lecture about smoking cessation in order to obtain a baseline questionnaire which included the number of smoking years, the number of attempts to stop smoking, the longest smoking cessation period, the most recent smoking cessation attempt, other smokers in the family, smoking relatives other than the immediate family, drinking, determination for abstinence, CAGE score,<sup>11</sup> Fagerstrom Tolerance Questionnaire score (FTQ),<sup>12</sup> Why test, etc.

While using the ear acupuncture treatment, a 5-point Likert scale questionnaire was used every week to assess changes in the taste of cigarettes, changes in the desire to smoke, changes of the number of cigarettes smoked, the type of withdrawal symptoms that occurred with smoking cessation and the number of days that ear acupuncture was applied.

### Procedure of ear acupuncture

Ear acupuncture was given for four weeks. Ear acupuncture, made from metal with adhesion paper for indwelling, was placed on both ears alternatively every week. The case group subjects were given at the 'shinmun', 'lung', 'chim', and 'oral' points, which are known to be effective in smoking cessation. The control group was given treatment at selected 'external ear', 'sympathetic', 'hepatic', and 'subcutaneous' points, which were considered to be irrelevant to smoking cessation.<sup>13</sup>

### Statistical analysis

SAS 8.1. T-test,  $\chi^2$ -test, ANOVA test, Wilcoxon test, Spearman correlation analysis, repeated measures ANOVA test, and *p*-value linear trend analysis were used to analyze the effects of the ear acupuncture and the factors that affect changes in the taste of tobacco and the desire to smoke, and reduction in cigarette consumption.

## RESULTS

### General characteristics

The subjects in this study were all male, and there was no difference in age composition of two

groups statistically ( $p=0.539$ , Table 1). The starting age, at which the students began smoking, ranged from 13 to 18 years old and the difference was not significant statistically ( $p=0.926$ , Table 1). The number of attempts to stop smoking ranged from 0 to 5 times, and there was no difference between the groups ( $p=0.106$ , Table 1).

There was no statistically significant difference in the allowance given to the subjects ( $p=0.682$ ).

### Smokers in family members and smokers in close relatives

The incidence of subjects who had smoking family members was 119 out of 159 in the case group and 62 out of 79 in the control group. There was no difference between the two group ( $p=$

**Table 1.** General Characteristics

	Case group	Control group	Sum
Age constitution			
15	13 (8.2)	5 (6.3)	18 (7.6)
16	56 (35.2)	31 (39.2)	87 (36.5)
17	52 (32.7)	30 (38.0)	82 (34.4)
18	36 (22.6)	12 (15.2)	48 (20.2)
19	2 (1.3)	1 (1.3)	3 (1.3)
Sum	159 (100.0)	79 (100.0)	238 (100.0)
Age at the beginning of smoking			
13	18 (13.6)	9 (13.0)	27 (13.4)
14 - 16	104 (78.8)	56 (81.3)	160 (79.6)
17 - 18	10 (7.6)	4 (5.7)	14 (7.0)
Sum	132 (100.0)	69 (100.0)	201 (100.0)
Number of attempts to stop smoking			
1	7 (10.8)	16 (20.3)	33 (13.9)
2	36 (22.9)	10 (12.7)	46 (19.5)
3	26 (16.6)	17 (21.5)	43 (18.2)
4	53 (33.3)	27 (34.8)	80 (33.9)
5	25 (15.9)	9 (11.4)	34 (14.4)
Sum	157 (100.0)	79 (100.0)	236 (100.0)

Data are expressed as number of subjects (%).  
All participants are male.

0.061). The incidence of smoking in family members other than the immediate family was 146 out of 159 subjects in the case group and 75 out of 79 subjects in the control group. There was no difference between the two groups ( $p=0.464$ ).

#### Nicotine depending score (Fagerstrom Tolerance Questionnaire)

The difference in distribution of the nicotine dependence score between the case and control groups was not significant statistically ( $p=0.734$ , Table 2).

#### Alcohol related characteristics

Regarding drinking habits, 140 of the subjects answered 'drink' (89.2%), 10 'not drink' (6.4%), and 7 'quit' (4.4%) in the case group, compared to 72 (92.4%), 3 (3.8%), and 3 (3.8%), respectively, in the control group. The difference between the two groups was not significant ( $p=0.704$ ).

By 'CAGE questionnaire' in the case group, 59 scored 0, 43 scored 1, and 37 scored more than 2. In the control group, 22 scored 0, 28 scored 1, and 20 scored more than 2. There was no statistically

significant difference between the two groups ( $p=0.194$ ).

#### Smoking cessation after treatment

The smoking cessation success was only 1 case (0.6%) in the case group and none in the control group after 4 weeks.

#### Comparison of the change in the taste of tobacco

There was no statistically significant difference between the two groups in terms of the change in the taste of tobacco ( $p > 0.05$ , Table 3). However, there was a tendency of reduction in the taste of tobacco in the case group ( $p < 0.05$ ) but not in the control group ( $p > 0.05$ ).

#### Comparison of the change in the desire to smoke

The change in the desire to smoke in the case and control groups was not significantly different ( $p > 0.05$ , Table 4). The tendency of smoking desire to decrease was significant in the case group ( $p < 0.05$ ) but not in the control group ( $p > 0.05$ ).

**Table 2.** Nicotine Depending Scale (Fagerstrom Tolerance Questionnaire)

Fagerstrom Tolerance Questionnaire score	Case group	Control group	Sum
6	24	11	35
7	22	7	29
8	9	6	15
9	7	5	12
10	1	1	2
Sum	63	30	93

**Table 3.** Comparison of the Change in the Taste of Tobacco

Week	Case group	Control group
First	1.60 ± 0.7631 (0.0738)	1.54 ± 0.5025 (0.0666)
Second	1.77 ± 0.9098 (0.1095)	1.85 ± 0.9195 (0.1251)
Third	1.30 ± 0.8421 (0.1255)	1.68 ± 0.8312 (0.1031)
Fourth	1.88 ± 0.7931 (0.1209)	1.81 ± 0.8206 (0.1451)

Data are expressed as mean ± S.D. ( $p$ -value by t-test).

**Table 4.** Comparison of the Change in the Desire to Smoke

Week	Case group	Control group
First	1.55 ± 0.7553 (0.0730)	1.55 ± 0.5974 (0.0784)
Second	1.62 ± 0.7878 (0.0948)	1.39 ± 0.9751 (0.1315)
Third	1.84 ± 0.8516 (0.1270)	1.66 ± 0.8154 (0.1011)
Fourth	1.83 ± 0.8432 (0.1286)	1.84 ± 0.8466 (0.1497)

Data are expressed as mean ± S.D. (*p*-value by t-test).

**Table 5.** Comparison of the Reduction in Cigarette Consumption

Week	Case group	Control group
First	-2.47 ± 2.9401 (0.2829)	-2.05 ± 4.3425 (0.5702)
Second	-2.53 ± 4.7993 (0.7043)	-3.19 ± 4.3422 (0.7929)
Third	-4.67 ± 5.3426 (0.8555)	-2.09 ± 5.9154 (0.7767)
Fourth	-4.19 ± 5.0618 (0.7810)	-3.16 ± 6.4213 (1.1351)

Data are expressed as mean ± S.D. (*p*-value).

### Comparison of the reduction in cigarette consumption

The changes of number of cigarettes smoked were not significantly different between the two groups ( $p > 0.05$ , Table 5). The number of attempts to quit smoking, whether or not other family members and close relatives smoked, the Fagerstrom Tolerance Questionnaire, and whether or not the subjects consumed alcohol did not influence the changes of number of cigarettes smoked or the smoking cessation.

## DISCUSSION

Various methods to stop smoking have been developed and their effectiveness studied, but none of them has been verified to be highly successful. Nicotine patch, as a nicotine alternative treatment, and bupropion, as an antidepressant, have been considered to be the most effective methods for smoking cessation. Recently, acupuncture, herbs, and aroma have been used as alternative medicines to stop smoking, but such methods have been used without definite research supporting their effects.

Several researchers have studied smoking

cessation acupuncture since the early 1970s but the results are controversial. According to Ballal et al.,<sup>14</sup> performing smoking cessation acupuncture for six weeks produced a smoking cessation rate of 50.1%, 45.5% of the subjects reduced their consumption to 5 cigarettes and 4.3% failed to reduce smoking. Meanwhile, Fuller et al.<sup>15</sup> used 3 electric ear acupuncture procedure on 194 smokers, and reported a 95% success rate; among them 41% stopped smoking after 6 months and 30% stopped smoking after 2 years. In addition, Hackett et al.<sup>16</sup> reported a success rate of 50% 12 months after electric ear acupuncture. After using acupuncture treatment on 514 persons, Choy et al.<sup>17</sup> reported a success rate of 88%, and a recurrence rate of 31% in the second year of treatment. As for acupuncture method using laser, Zaleskiy et al.<sup>18</sup> reported a smoking cessation rate of 71% in 85 persons.

Several researchers have conducted case control studies on smoking cessation acupuncture. He et al.<sup>19</sup> reported that acupuncture treatment showed significant effectiveness in a case-control study, but most other researchers, including Parker et al.<sup>20</sup> and Steiner et al.,<sup>21</sup> reported that there was no apparent difference between the control and acupuncture treatment groups. Gillams et al.<sup>22</sup> also reported no significant difference between the

control and acupuncture treatment groups when the acupuncture was applied on remote areas from the lung site of the ear in the control group, that was known as one of the smoking cessation acupuncture points. Results of a meta-analysis of controlled trials were also negative.<sup>23</sup>

In this study, the smoking cessation success was only 1 case (0.6%) in the case group and none in the control group after 4 weeks. One of the main reasons for this low success rate was the low motivation of the subjects, who participated not by their own decision but by their teachers. This was the major limitation of this study. The results of this study revealed that there was no difference in smoking cessation, similar to those of the above studies. Nevertheless, as time passed, the changes in the taste and desires of tobacco in the case group were decreased. That suggests acupuncture treatments have some effects on taste and desire of smoking, but are not good enough to quit the smoking.

Generally 6-month follow-up is needed in order to correctly judge the success rate of smoking cessation, but this study failed to determine whether each subject successfully stopped smoking because many of the students had a winter vacation or graduated from school and could not be followed. Due to such limitation, it was not certain that there was a difference between the case and control group in smoking cessation rate.

While the samples in this study could not be generalized because the subjects were limited in a certain area, this study suggests that smoking cessation acupuncture has no effect on the smoking cessation rate. However, this study verified the changes in tastes and desires that had been reported in previous case-control studies.<sup>9</sup>

Moreover, we could not randomize the subjects into the case and control groups because the subjects went to the same school. Therefore, we had to classify the subjects into the two groups by schools. However, we identified that there was no significant difference between the two groups in subject characteristics.

Considering that there was no significant difference in the results of this study, other factors except the acupuncture or only acupuncture regardless of effective sites may induce the increases in smoking cessation rate and smoking decrease

rate. Further studies will be necessary to identify the uncertainty.

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